- **DSA Practice Questions TopicWise**

➢ **Time Complexity , Space Complexity & BigO** ➖

01. What do you mean by Time & Space Complexity?
02. Difference between Time & Space Complexity?
03. What do you mean by BigO notation?
04. What is the Worst Case vs Best case vs average case?
05. Explain the difference between `O(1)` vs `O(n)` space complexities
06. Provide an example of `O(1)` algorithm

Practice questions on Compleixeity:-
https://docs.google.com/document/d/1j_KyUdlbZEC23-nwXjZhlnifWuooGD4CsibpIKzTHLY/edit?usp=sharing

➢ **Frequency Count Method:-**

01. What is the “Frequency Counter” pattern?
02. When should we use the Frequency Counter pattern?

Practice questions on Frequency Counter

1. https://leetcode.com/problems/valid-anagram/
2. https://leetcode.com/problems/top-k-frequent-elements/
3. https://leetcode.com/problems/sort-characters-by-frequency/
4. https://practice.geeksforgeeks.org/problems/sort-an-array-of-0s-1s-and-2s4231/1?utm_source=geeksforgeeks&utm_medium=article_practice_tab&utm_campaign=article_practice_tab
5. Word Frequency Count Problem

➢ **Multiple Pointer Method**

01. What is a two pointer method?
02. How do you declare multiple pointers?

Practice questions on Multiple Pointer Method:-

1. Remove Duplicates from Sorted Array
2. Two Sum II - Input array is sorted
3. .Rotate Array :- Reference Material
4. Container With Most Water
5. Product of Array Except Self

More problems based on two pointer techniques.

➢ Sliding Window

01.What is Sliding window?Write the algorithm of sliding window using example.

Practice questions on Sliding Window:-

01.https://practice.geeksforgeeks.org/problems/subarray-with-given-sum-1587115621/1?utm_source=geeksforgeeks&utm_medium=article_practice_tab&utm_campaign=article_practice_tab

➢ Substrings of Size

02.Longest Substring Of All Vowels in Order

03.Three with Distinct Characters

04.Longest Substring,

05.Contains Duplicate

06.No Repeated Characters,

07.Longest Subarray of 1's After deleting one element

➢ Recursion:-

- What is recursion ? How does it work?
- How to solve a problem recursively?
- How to analyze the time and space complexity of a recursive algorithm?
- How can we apply recursion in a better way?

➢ Practice questions on Recursion:-

01. https://leetcode.com/problems/fibonacci-number/
02. https://leetcode.com/problems/power-of-four
03. https://leetcode.com/problems/power-of-two
04. https://leetcode.com/problems/power-of-three
05. Regular Expression Matching
06. Count Good Numbers
07. Valid Palindrome

➢ Sorting:-

Q1.How many types of Sorting? Name them

Q2.Explain these terms with its time Complexity in worst case , Average Case & Best case:-

1. Insertion sort 2. Selection sort 3.Bubble sort 4. Quick sort 5. Merge sort

Q3.Differentiate between:-

Insertion sort Vs Selection sort Vs Bubble sort Vs Quicksort Vs Merge sort

- **Practice questions on Sorting:-**

01. https://leetcode.com/problems/merge-intervals

02. https://leetcode.com/problems/insert-interval

03. https://leetcode.com/problems/maximum-gap

04. https://leetcode.com/problems/find-k-pairs-with-smallest-sums

05. https://leetcode.com/problems/k-th-smallest-prime-fraction

- **Searching:-**

Q1. What do you understand by a searching algorithm? List a few types of searching algorithms with an example.

Q2.Describe the following along with their complexity :

a).Linear Search b). Binary Search

Q3. Differentiate between

a). Linear & Binary Search b). Sorting & Searching

Practice question:-

01.https://leetcode.com/problems/search-insert-position/

02.https://leetcode.com/problems/search-a-2d-matrix/

03. https://leetcode.com/problems/binary-search/

04.https://leetcode.com/problems/sqrtx/

05.https://leetcode.com/problems/search-in-rotated-sorted-array-ii/

06.More Practice Problem

➢ **Lists:-**

1. What do you mean by Linked List? How many types of Linked list ? Explain.

2. Write space & time complexity of linked list ?

3. Differentiate between Singly & Doubly linked lists ?

4. Write an algorithm for the Singly & Doubly linked list by taking an example by yourself.

Practice Problem:-

https://leetcode.com/problems/remove-nth-node-from-end-of-list/

https://leetcode.com/problems/remove-duplicates-from-sorted-list/

https://leetcode.com/problems/linked-list-cycle/

Remove Linked List Elements

Linked List Cycle

Palindrome Linked List

Merge Two Sorted Lists

Rotate List

Remove Nth Node From End of List

https://leetcode.com/problems/add-two-numbers

https://leetcode.com/problems/reverse-linked-list

➢ **Stack & Queue:-**

1.Define Stack?What are the operations that can be performed on

stacks?Explain why Stack is a recursive data structure?

2.Why and when should I use Stack or Queue data structures instead of Arrays/Lists?

3.Why Are Stacks Useful? How to implement Linked List Using Stack?

4.List some Queue real-life applications ?What is Complexity Analysis of Queue operations like insertion,search,deletion?

5.What are some types of Queue?Explain

6. Differentiate between a).Stack & Queue b).enqueue and dequeue c).LIFO & FIFO.

Practice questions:-

Implement Queue using Stacks

Implement Stack using Queues

Backspace String Compare

Decode String

Valid Parenthesis String

Trapping Rain Water

https://leetcode.com/problems/largest-rectangle-in-histogram

https://leetcode.com/problems/smallest-k-length-subsequence-with-occurrences-of-a-letter

Longest Valid Parentheses

➢ Trees:-

1. What do you mean by tree transversal ? What are the three ways which we use to transverse a tree?
2. Explain AVL tree?

3. Difference between Binary tree & Binary Search tree?

4. Explain Complexity of different operations in Binary tree, Binary Search Tree and AVL tree?

Practice Problems:-

Find a Corresponding Node of a Binary Tree in a Clone of That Tree

Range Sum of BST

Root Equals Sum of Children

N-ary Tree Postorder Traversal

N-ary Tree Preorder Traversal

Maximum Depth of N-ary Tree

Convert Sorted Array to Binary Search Tree

Binary Search Tree to Greater Sum Tree

Balance a Binary Search Tree

Kth Smallest Element in a BST

Print Binary Tree

Longest ZigZag Path in a Binary Tree

Delete Node in a BST

➢ **Graphs:-**

1. Explain Graph & its terminology?

2. Differentiate between the following?

a). BFS & DFS **b). Tree & Graph**

3.Write Complexity of BFS & DFS?

Practice Problems:-

1.Find Center of Star Graph

2.Find if Path Exists in Graph

3.Find the Town Judge

4.Is Graph Bipartite?

Dijkstra's algorithm:-

1. What is the Dijkstra Algorithm?

2.Explain the basic architecture of Dijkstra's algorithm along with an example?

3.Do you think it's possible to use a graph instead of a tree when implementing Dijkstra's algorithm? Why or why not?

4. Give some examples where you would use Dijkstra's algorithm?

5.Is it possible to use Dijkstra's algorithm for directed graphs?

6. Explain Application & Limitations of Dijkstra's algorithm?

Practice Question:-

1. Path with Maximum Probability.

2.https://leetcode.com/problems/network-delay-time/

3.https://leetcode.com/problems/the-maze-ii/

4.https://leetcode.com/problems/path-with-minimum-effort/

5.https://leetcode.com/problems/find-the-city-with-the-smallest-number-of-neighbors-at-a-threshold-distance/

- **Dynamic Programming**

Q1. Define Dynamic Programming ? How does the dynamic programming approach work?

- **Practice Problem:-**

01.Climbing Stair Problem

02.Knapsack Problem

03.Edit Distance Problem

04.Longest palindromic subsequence

05.Best Time to Buy and Sell Stock

06.https://leetcode.com/problems/fibonacci-number/

07.Coin Change

08.https://leetcode.com/problems/longest-common-subsequence/

09.https://leetcode.com/problems/partition-equal-subset-sum/

10.https://leetcode.com/problems/continuous-subarray-sum/